



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Yoo, et al.

Serial No.: 10/023,125

Confirmation No.: Unknown

Filed: December 17, 2001

**For: Pulse Nucleation Enhanced
Nucleation Technique for
Improved Step Coverage
and Better Gap Fill for
WCVD Process**

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**Group Art Unit: Unknown**

**Examiner:** Unknown

Assistant Commissioner for Patents  
Washington, D.C. 20231

**Dear Sir:**

**CERTIFICATE UNDER 37 CFR 1.10**

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited on April 4/3, 2002, with the United States Postal Service in an envelope as "Express Mail Post Office to Addressee," mailing label No. E004735031 addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

4/3/02 Date B. Todd Patterson Signature

## INFORMATION DISCLOSURE STATEMENT

The Applicants, and the Attorney who signs below on the basis of the information supplied by the inventor and the information in his file, submit herewith patents, publications, or other information of which they are aware, which may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR § 1.56.

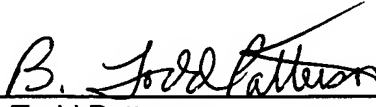
While the information submitted in this Information Disclosure Statement may be material pursuant to 37 CFR § 1.56, it is not intended to constitute an admission that any patent, publication, or other information referred to therein is prior art for this invention unless specifically designated as such.

In accordance with 37 CFR § 1.97, this Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other possibly material information as defined under 37 CFR § 1.56(a) exists.

The patents and/or publications submitted herewith are set forth on the attached Form PTO-1449.

The Applicants do not feel that a fee is necessary at this time, but if the sum of \$180.00 is due under 37 CFR § 1.17(p) pursuant to § 1.97, the Commissioner is hereby authorized to charge this fee, and any other fee necessary to make this submission timely, to the Deposit Account No. 20-0782/AMAT/5730/TCG/WCVD/LE/BTP.

Respectfully submitted,

  
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Attorney for Applicants

|                                                                                                                                                                                                                                           |     |                                                                                                                                                                                                 |            |                   |                                  |          |                            |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------|----------------------------------|----------|----------------------------|----|
| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified)                                                                                                                                                      |     |                                                                                                                                                                                                 |            |                   | Docket No.<br>AMAT/5730          |          | Serial No.<br>10/023,125   |    |
| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                                                                                                                                                                                |     |                                                                                                                                                                                                 |            |                   | Applicant<br>Yoo, et al.         |          |                            |    |
| (Use several sheets if necessary)                                                                                                                                                                                                         |     |                                                                                                                                                                                                 |            |                   | Filing Date<br>December 17, 2001 |          | Group<br>Unknown           |    |
| Examiner Unknown                                                                                                                                                                                                                          |     |                                                                                                                                                                                                 |            |                   |                                  |          |                            |    |
| <b>U.S. Patent Documents</b>                                                                                                                                                                                                              |     |                                                                                                                                                                                                 |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                                                 | Issue Date | Applicant(s) Name | Class                            | Subclass | Filing Date If Appropriate |    |
|                                                                                                                                                                                                                                           | A1  | 4,058,430                                                                                                                                                                                       | 11/15/77   | Suntola et al.    | 156                              | 611      | 11/25/1975                 |    |
|                                                                                                                                                                                                                                           | A2  | 4,389,973                                                                                                                                                                                       | 06/28/83   | Suntola et al.    | 118                              | 725      | 12/11/1981                 |    |
|                                                                                                                                                                                                                                           | A3  | 4,413,022                                                                                                                                                                                       | 11/01/83   | Suntola et al.    | 427                              | 255.2    | 06/21/1979                 |    |
|                                                                                                                                                                                                                                           | A4  | 4,486,487                                                                                                                                                                                       | 12/04/84   | Skarp             | 428                              | 216      | 04/25/1983                 |    |
|                                                                                                                                                                                                                                           | A5  | 4,767,494                                                                                                                                                                                       | 08/30/88   | Kobayashi et al.  | 156                              | 606      | 09/19/1986                 |    |
|                                                                                                                                                                                                                                           | A6  | 4,806,321                                                                                                                                                                                       | 02/21/89   | Nishizawa et al.  | 422                              | 245      | 07/21/1985                 |    |
|                                                                                                                                                                                                                                           | A7  | 4,829,022                                                                                                                                                                                       | 05/09/89   | Kobayashi et al.  | 437                              | 107      | 12/09/1986                 |    |
|                                                                                                                                                                                                                                           | A8  | 4,834,831                                                                                                                                                                                       | 05/30/89   | Nishizawa et al.  | 156                              | 611      | 09/04/1987                 |    |
|                                                                                                                                                                                                                                           | A9  | 4,838,983                                                                                                                                                                                       | 06/13/89   | Schumaker et al.  | 156                              | 613      | 03/18/1988                 |    |
|                                                                                                                                                                                                                                           | A10 | 4,838,993                                                                                                                                                                                       | 06/13/89   | Aoki et al.       | 156                              | 643      | 12/03/1987                 |    |
|                                                                                                                                                                                                                                           | A11 | 4,840,921                                                                                                                                                                                       | 06/20/89   | Matsumoto         | 437                              | 89       | 06/30/1988                 |    |
|                                                                                                                                                                                                                                           | A12 | 4,845,049                                                                                                                                                                                       | 07/04/89   | Sunakawa          | 437                              | 81       | 03/28/1988                 |    |
|                                                                                                                                                                                                                                           | A13 | 4,859,625                                                                                                                                                                                       | 08/22/89   | Nishizawa et al.  | 437                              | 81       | 11/20/1987                 |    |
| <b>Foreign Patent Documents</b>                                                                                                                                                                                                           |     |                                                                                                                                                                                                 |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                                                 | Date       | Country           | Class                            | Subclass | Translation                |    |
|                                                                                                                                                                                                                                           |     |                                                                                                                                                                                                 |            |                   |                                  |          | YES                        | NO |
|                                                                                                                                                                                                                                           | B1  | 01/66832 A2                                                                                                                                                                                     | 09/13/2001 | WO                | C30B                             | 16/44    |                            | X  |
|                                                                                                                                                                                                                                           | B2  | 01/40541 A1                                                                                                                                                                                     | 06/07/2001 | WO                | C23C                             | 16/40    |                            | X  |
|                                                                                                                                                                                                                                           | B3  | 01/36702 A1                                                                                                                                                                                     | 05/25/2001 | WO                | C23C                             | 16/00    |                            | X  |
|                                                                                                                                                                                                                                           | B4  | 01/29893 A1                                                                                                                                                                                     | 04/26/2001 | WO                | H01L                             | 21/768   |                            | X  |
|                                                                                                                                                                                                                                           | B5  | 01/29891 A1                                                                                                                                                                                     | 04/26/2001 | WO                | H01L                             | 21/768   |                            | X  |
| <b>OTHER ART</b>                                                                                                                                                                                                                          |     |                                                                                                                                                                                                 |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                                                                            |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C1  | Hultman, et al., "Review of the thermal and mechanical stability of TiN-based thin films", <i>Zeitschrift Fur Metalkunde</i> , 90(10) (Oct. 1999), pp. 803-813.                                 |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C2  | Klaus, et al., "Atomic Layer Deposition of SiO <sub>2</sub> Using Catalyzed and Uncatalyzed Self-Limiting Surface Reactions", <i>Surface Review &amp; Letters</i> , 6(3&4) (1999), pp. 435-448. |            |                   |                                  |          |                            |    |
| Examiner                                                                                                                                                                                                                                  |     |                                                                                                                                                                                                 |            |                   | Date Considered                  |          |                            |    |
| *EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant. |     |                                                                                                                                                                                                 |            |                   |                                  |          |                            |    |

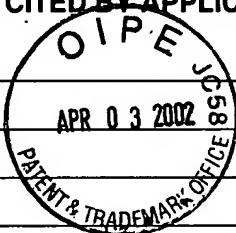
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|--------------------------------------------------------------------------------------|--|--|--|--|----------------------------------|--|--------------------------|--|
| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified) |  |  |  |  | Docket No.<br>AMAT/5730          |  | Serial No.<br>10/023,125 |  |
| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                           |  |  |  |  | Applicant<br>Yoo, et al.         |  |                          |  |
| (Use several sheets if necessary)                                                    |  |  |  |  | Filing Date<br>December 17, 2001 |  | Group<br>Unknown         |  |
| Examiner Unknown                                                                     |  |  |  |  |                                  |  |                          |  |

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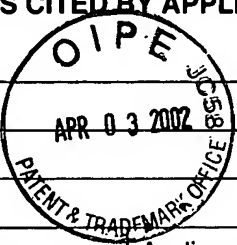
| U.S. Patent Documents |     |                 |            |                   |       |          |                            |
|-----------------------|-----|-----------------|------------|-------------------|-------|----------|----------------------------|
| *Examiner Initial     |     | Document Number | Issue Date | Applicant(s) Name | Class | Subclass | Filing Date If Appropriate |
|                       | A14 | 4,859,627       | 08/22/89   | Sunakawa          | 437   | 81       | 07/01/1988                 |
|                       | A15 | 4,861,417       | 08/29/89   | Mochizuki et al.  | 156   | 610      | 03/24/1988                 |
|                       | A16 | 4,876,218       | 10/24/89   | Pessa et al.      | 437   | 107      | 09/26/1988                 |
|                       | A17 | 4,927,670       | 05/22/1990 | Erbil             | 427   | 255.3    | 06/22/1988                 |
|                       | A18 | 4,931,132       | 06/05/90   | Aspnes et al.     | 156   | 601      | 10/07/1988                 |
|                       | A19 | 4,960,720       | 10/02/90   | Shimbo            | 437   | 105      | 08/24/1987                 |
|                       | A20 | 4,975,252       | 12/04/90   | Nishizawa et al.  | 422   | 245      | 05/26/1989                 |
|                       | A21 | 4,993,357       | 02/19/91   | Scholz            | 118   | 715      | 12/21/1989                 |
|                       | A22 | 5,013,683       | 05/07/91   | Petroff et al.    | 437   | 110      | 01/23/1989                 |
|                       | A23 | 5,082,798       | 01/21/92   | Arimoto           | 437   | 108      | 09/27/1990                 |
|                       | A24 | 5,085,885       | 02/04/92   | Foley et al.      | 477   | 38       | 09/10/1990                 |
|                       | A25 | 5,091,320       | 02/25/92   | Aspnes et al.     | 437   | 8        | 06/15/1990                 |
|                       | A26 | 5,130,269       | 07/14/92   | Kitahara et al.   | 437   | 111      | 04/25/1989                 |
|                       | A27 | 5,166,092       | 11/24/92   | Mochizuki et al.  | 437   | 105      | 10/30/1990                 |


| Foreign Patent Documents |    |                 |            |         |       |          |             |    |
|--------------------------|----|-----------------|------------|---------|-------|----------|-------------|----|
| *Examiner Initial        |    | Document Number | Date       | Country | Class | Subclass | Translation |    |
|                          |    |                 |            |         |       |          | YES         | NO |
|                          | B6 | 01/29280 A1     | 04/26/2001 | WO      | C23C  | 16/32    |             | X  |
|                          | B7 | 01/27347 A1     | 04/19/2001 | WO      | C23C  | 16/44    |             | X  |
|                          | B8 | 01/27346 A1     | 04/19/2001 | WO      | C23C  | 16/44    |             | X  |
|                          | B9 | 01/15220 A1     | 03/01/2001 | WO      | H01L  | 21/768   |             | X  |

| OTHER ART                                                                                                                                                                                                                                 |    |                                                                                                                                                                                       |
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| *Examiner Initial                                                                                                                                                                                                                         |    | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                                                                  |
|                                                                                                                                                                                                                                           | C3 | Yamaguchi, et al., "Atomic-layer chemical-vapor-deposition of silicon dioxide films with extremely low hydrogen content", <i>Appl. Surf. Sci.</i> , Vol. 130-132 (1998), pp. 202-207. |
|                                                                                                                                                                                                                                           | C4 | George, et al., "Surface Chemistry for Atomic Layer Growth", <i>J. Phys. Chem.</i> , Vol. 100 (1996), pp. 13121-131.                                                                  |
| Examiner                                                                                                                                                                                                                                  |    | Date Considered                                                                                                                                                                       |
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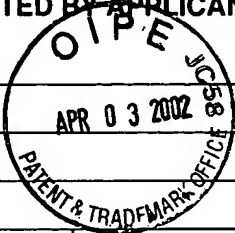
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| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                                                                                                                                                                                |     |                                                                                                                                                                                                                        |            |                   | Applicant<br>Yoo, et al.         |          |                            |    |
| (Use several sheets if necessary)                                                                                                                                                                                                         |     |                                                                                                                                                                                                                        |            |                   | Filing Date<br>December 17, 2001 |          | Group<br>Unknown           |    |
| Examiner Unknown                                                                                                                                                                                                                          |     |                                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
|                                                                                                                                                          |     |                                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
| <b>U.S. Patent Documents</b>                                                                                                                                                                                                              |     |                                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                                                                        | Issue Date | Applicant(s) Name | Class                            | Subclass | Filing Date If Appropriate |    |
|                                                                                                                                                                                                                                           | A28 | 5,225,366                                                                                                                                                                                                              | 07/06/93   | Yoder             | 437                              | 108      | 06/22/1990                 |    |
|                                                                                                                                                                                                                                           | A29 | 5,246,536                                                                                                                                                                                                              | 09/21/93   | Nishizawa et al.  | 156                              | 610      | 03/10/1989                 |    |
|                                                                                                                                                                                                                                           | A30 | 5,250,148                                                                                                                                                                                                              | 10/05/93   | Nishizawa et al.  | 156                              | 611      | 11/12/1991                 |    |
|                                                                                                                                                                                                                                           | A31 | 5,254,207                                                                                                                                                                                                              | 10/19/93   | Nishizawa et al.  | 156                              | 601      | 11/30/1992                 |    |
|                                                                                                                                                                                                                                           | A32 | 5,256,244                                                                                                                                                                                                              | 10/26/93   | Ackerman          | 156                              | 613      | 02/10/1992                 |    |
|                                                                                                                                                                                                                                           | A33 | 5,270,247                                                                                                                                                                                                              | 12/14/93   | Sakuma et al.     | 437                              | 133      | 07/08/1992                 |    |
|                                                                                                                                                                                                                                           | A34 | 5,278,435                                                                                                                                                                                                              | 01/11/94   | Van Hove et al.   | 257                              | 184      | 06/08/1992                 |    |
|                                                                                                                                                                                                                                           | A35 | 5,281,274                                                                                                                                                                                                              | 01/25/94   | Yoder             | 118                              | 697      | 02/04/1993                 |    |
|                                                                                                                                                                                                                                           | A36 | 5,290,748                                                                                                                                                                                                              | 03/01/94   | Knuuttila et al.  | 502                              | 228      | 07/16/1992                 |    |
|                                                                                                                                                                                                                                           | A37 | 5,294,286                                                                                                                                                                                                              | 03/15/94   | Nishizawa et al.  | 156                              | 610      | 01/12/1993                 |    |
|                                                                                                                                                                                                                                           | A38 | 5,296,403                                                                                                                                                                                                              | 03/22/94   | Nishizawa et al.  | 437                              | 133      | 10/23/1992                 |    |
|                                                                                                                                                                                                                                           | A39 | 5,300,186                                                                                                                                                                                                              | 04/05/94   | Kitahara et al.   | 156                              | 613      | 04/07/1992                 |    |
|                                                                                                                                                                                                                                           | A40 | 5,311,055                                                                                                                                                                                                              | 05/10/94   | Goodman et al.    | 257                              | 593      | 11/22/1991                 |    |
| <b>Foreign Patent Documents</b>                                                                                                                                                                                                           |     |                                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                                                                        | Date       | Country           | Class                            | Subclass | Translation                |    |
|                                                                                                                                                                                                                                           |     |                                                                                                                                                                                                                        |            |                   |                                  |          | YES                        | NO |
|                                                                                                                                                                                                                                           | B10 | 00/79576 A1                                                                                                                                                                                                            | 12/28/2000 | WO                | H01L                             | 21/205   |                            | X  |
|                                                                                                                                                                                                                                           | B11 | 00/79019 A1                                                                                                                                                                                                            | 12/28/2000 | WO                | C23C                             | 16/00    |                            | X  |
|                                                                                                                                                                                                                                           | B12 | 00/63957 A1                                                                                                                                                                                                            | 10/26/2000 | WO                | H01L                             | 21/205   |                            | X  |
| <b>OTHER ART</b>                                                                                                                                                                                                                          |     |                                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                                                                                                   |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C5  | George, et al., "Atomic layer controlled deposition of SiO <sub>2</sub> and Al <sub>2</sub> O <sub>3</sub> using ABAB...binary reaction sequence chemistry", <i>Appl. Surf. Sci.</i> , Vol. 82/83 (1994), pp. 460-467. |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C6  | Wise, et al., "Diethyldiethoxysilane as a new precursor for SiO <sub>2</sub> growth on silicon", <i>Mat. Res. Soc. Symp. Proc.</i> , Vol. 334 (1994), pp. 37-43.                                                       |            |                   |                                  |          |                            |    |
| Examiner                                                                                                                                                                                                                                  |     |                                                                                                                                                                                                                        |            |                   | Date Considered                  |          |                            |    |
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|                                                                                                                                                                                                                                           |     |                                                                                                                                                                               |            |                   |                                  |          |                            |    |
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| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified)                                                                                                                                                      |     |                                                                                                                                                                               |            |                   | Docket No.<br>AMAT/5730          |          | Serial No.<br>10/023,125   |    |
| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                                                                                                                                                                                |     |                                                                                                                                                                               |            |                   | Applicant<br>Yoo, et al.         |          |                            |    |
| (Use several sheets if necessary)                                                                                                                                                                                                         |     |                                                                                                                                                                               |            |                   | Filing Date<br>December 17, 2001 |          | Group<br>Unknown           |    |
| Examiner Unknown                                                                                                                                                                                                                          |     |                                                                                                                                                                               |            |                   |                                  |          |                            |    |
| <b>U.S. Patent Documents</b>                                                                                                                                                                                                              |     |                                                                                                                                                                               |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                               | Issue Date | Applicant(s) Name | Class                            | Subclass | Filing Date If Appropriate |    |
|                                                                                                                                                                                                                                           | A41 | 5,316,615                                                                                                                                                                     | 05/31/94   | Copel             | 117                              | 95       | 03/09/1993                 |    |
|                                                                                                                                                                                                                                           | A42 | 5,316,793                                                                                                                                                                     | 05/31/94   | Wallace et al.    | 427                              | 248.1    | 07/27/1992                 |    |
|                                                                                                                                                                                                                                           | A43 | 5,330,610                                                                                                                                                                     | 07/19/94   | Eres et al.       | 117                              | 86       | 05/28/1993                 |    |
|                                                                                                                                                                                                                                           | A44 | 5,336,324                                                                                                                                                                     | 08/09/94   | Stall et al.      | 118                              | 719      | 12/04/1991                 |    |
|                                                                                                                                                                                                                                           | A45 | 5,338,389                                                                                                                                                                     | 08/16/94   | Nishizawa et al.  | 117                              | 89       | 04/21/1993                 |    |
|                                                                                                                                                                                                                                           | A46 | 5,348,911                                                                                                                                                                     | 09/20/94   | Jurgensen et al.  | 117                              | 91       | 04/26/1993                 |    |
|                                                                                                                                                                                                                                           | A47 | 5,374,570                                                                                                                                                                     | 12/20/94   | Nasu et al.       | 437                              | 40       | 08/19/1993                 |    |
|                                                                                                                                                                                                                                           | A48 | 5,395,791                                                                                                                                                                     | 03/07/95   | Cheng et al.      | 437                              | 105      | 10/20/1993                 |    |
|                                                                                                                                                                                                                                           | A49 | 5,438,952                                                                                                                                                                     | 08/08/1995 | Otsuka            | 117                              | 84       | 01/31/1994                 |    |
|                                                                                                                                                                                                                                           | A50 | 5,439,876                                                                                                                                                                     | 08/08/95   | Graf et al.       | 505                              | 447      | 08/16/1993                 |    |
|                                                                                                                                                                                                                                           | A51 | 5,441,703                                                                                                                                                                     | 08/15/95   | Jurgensen         | 422                              | 129      | 03/29/1994                 |    |
|                                                                                                                                                                                                                                           | A52 | 5,443,033                                                                                                                                                                     | 08/22/95   | Nishizawa et al.  | 117                              | 86       | 03/11/1994                 |    |
|                                                                                                                                                                                                                                           | A53 | 5,443,647                                                                                                                                                                     | 08/22/95   | Aucoin et al.     | 118                              | 723 ME   | 07/11/1994                 |    |
|                                                                                                                                                                                                                                           | A54 | 5,455,072                                                                                                                                                                     | 10/03/95   | Bension et al.    | 427                              | 255.7    | 11/18/1992                 |    |
| <b>Foreign Patent Documents</b>                                                                                                                                                                                                           |     |                                                                                                                                                                               |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                               | Date       | Country           | Class                            | Subclass | Translation                |    |
|                                                                                                                                                                                                                                           |     |                                                                                                                                                                               |            |                   |                                  |          | YES                        | NO |
|                                                                                                                                                                                                                                           | B13 | 00/54320 A1                                                                                                                                                                   | 09/14/2000 | WO                | H01L                             | 21/44    |                            | X  |
|                                                                                                                                                                                                                                           | B14 | 00/16377 A2                                                                                                                                                                   | 03/23/2000 | WO                | H01L                             | ---      |                            | X  |
|                                                                                                                                                                                                                                           | B15 | 00/15881 A2                                                                                                                                                                   | 03/23/2000 | WO                | C30B                             | ---      |                            | X  |
|                                                                                                                                                                                                                                           | B16 | 00/15865 A1                                                                                                                                                                   | 03/23/2000 | WO                | C23C                             | 16/00    |                            | X  |
| <b>OTHER ART</b>                                                                                                                                                                                                                          |     |                                                                                                                                                                               |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                                                          |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C7  | Niinisto, et al., "Synthesis of oxide thin films and overlayers by atomic layer epitaxy for advanced applications", <i>Mat. Sci. &amp; Eng.</i> , Vol. B41 (1996), pp. 23-29. |            |                   |                                  |          |                            |    |
| Examiner                                                                                                                                                                                                                                  |     |                                                                                                                                                                               |            |                   | Date Considered                  |          |                            |    |
| *EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant. |     |                                                                                                                                                                               |            |                   |                                  |          |                            |    |

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| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified)                                                                                                                                                      |     |                                                                                                                                                                                                |            |                   | Docket No.<br>AMAT/5730          |          | Serial No.<br>10/023,125   |    |
| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                                                                                                                                                                                |     |                                                                                                                                                                                                |            |                   | Applicant<br>Yoo, et al.         |          |                            |    |
| (Use several sheets if necessary)                                                                                                                                                                                                         |     |                                                                                                                                                                                                |            |                   | Filing Date<br>December 17, 2001 |          | Group<br>Unknown           |    |
| Examiner Unknown                                                                                                                                                                                                                          |     |                                                                                                                                                                                                |            |                   |                                  |          |                            |    |
|                                                                                                                                                          |     |                                                                                                                                                                                                |            |                   |                                  |          |                            |    |
| <b>U.S. Patent Documents</b>                                                                                                                                                                                                              |     |                                                                                                                                                                                                |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                                                | Issue Date | Applicant(s) Name | Class                            | Subclass | Filing Date If Appropriate |    |
|                                                                                                                                                                                                                                           | A55 | 5,458,084                                                                                                                                                                                      | 10/17/95   | Thorne et al.     | 117                              | 89       | 12/09/1993                 |    |
|                                                                                                                                                                                                                                           | A56 | 5,469,806                                                                                                                                                                                      | 11/28/95   | Mochizuki et al.  | 117                              | 97       | 08/20/1993                 |    |
|                                                                                                                                                                                                                                           | A57 | 5,480,818                                                                                                                                                                                      | 01/02/96   | Matsumoto et al.  | 437                              | 40       | 02/09/1993                 |    |
|                                                                                                                                                                                                                                           | A58 | 5,483,919                                                                                                                                                                                      | 01/16/96   | Yokoyama et al.   | 117                              | 89       | 08/17/1994                 |    |
|                                                                                                                                                                                                                                           | A59 | 5,484,664                                                                                                                                                                                      | 01/16/96   | Kitahara et al.   | 428                              | 641      | 01/21/1994                 |    |
|                                                                                                                                                                                                                                           | A60 | 5,503,875                                                                                                                                                                                      | 04/02/96   | Imai et al.       | 427                              | 255.3    | 03/17/1994                 |    |
|                                                                                                                                                                                                                                           | A61 | 5,521,126                                                                                                                                                                                      | 05/28/96   | Okamura et al.    | 437                              | 235      | 06/22/1994                 |    |
|                                                                                                                                                                                                                                           | A62 | 5,527,733                                                                                                                                                                                      | 06/18/96   | Nishizawa et al.  | 437                              | 160      | 02/18/1994                 |    |
|                                                                                                                                                                                                                                           | A63 | 5,532,511                                                                                                                                                                                      | 07/02/96   | Nishizawa et al.  | 257                              | 627      | 03/23/1995                 |    |
|                                                                                                                                                                                                                                           | A64 | 5,540,783                                                                                                                                                                                      | 07/30/96   | Eres et al.       | 118                              | 725      | 05/26/1994                 |    |
|                                                                                                                                                                                                                                           | A65 | 5,601,651                                                                                                                                                                                      | 02/11/97   | Watabe            | 118                              | 715      | 12/14/1994                 |    |
|                                                                                                                                                                                                                                           | A66 | 5,616,181                                                                                                                                                                                      | 04/01/97   | Yamamoto et al.   | 118                              | 723 ER   | 11/21/1995                 |    |
|                                                                                                                                                                                                                                           | A67 | 5,637,530                                                                                                                                                                                      | 06/10/97   | Gaines et al.     | 114                              | 105      | 06/10/1996                 |    |
| <b>Foreign Patent Documents</b>                                                                                                                                                                                                           |     |                                                                                                                                                                                                |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Document Number                                                                                                                                                                                | Date       | Country           | Class                            | Subclass | Translation                |    |
|                                                                                                                                                                                                                                           |     |                                                                                                                                                                                                |            |                   |                                  |          | YES                        | NO |
|                                                                                                                                                                                                                                           | B17 | 99/41423 A2                                                                                                                                                                                    | 08/19/1999 | WO                | C23C                             | ---      |                            | X  |
|                                                                                                                                                                                                                                           | B18 | 99/29924 A1                                                                                                                                                                                    | 06/17/1999 | WO                | C23C                             | 16/04    |                            | X  |
|                                                                                                                                                                                                                                           | B19 | 99/01595                                                                                                                                                                                       | 01/14/1999 | WO                | C30B                             | 25/14    |                            | X  |
|                                                                                                                                                                                                                                           | B20 | 96/18756 A1                                                                                                                                                                                    | 06/20/1996 | WO                | C23C                             | 16/08    |                            | X  |
| <b>OTHER ART</b>                                                                                                                                                                                                                          |     |                                                                                                                                                                                                |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |     | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                                                                           |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C8  | Ritala, et al., "Perfectly conformal TiN and Al <sub>2</sub> O <sub>3</sub> films deposited by atomic layer deposition", <i>Chemical Vapor Deposition</i> , Vol. 5(1) (January 1999), pp. 7-9. |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C9  | Klaus, et al., "Atomically controlled growth of tungsten and tungsten nitride using sequential surface reactions". <i>Appl. Surf. Sci.</i> , Vol 162-163 (2000), pp. 479-491.                  |            |                   |                                  |          |                            |    |
| Examiner                                                                                                                                                                                                                                  |     |                                                                                                                                                                                                |            |                   | Date Considered                  |          |                            |    |
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| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified)                                                                                                                                                             |     |                                                                                                                                                                                                                                                           |            |                   | Docket No.<br>AMAT/5730          |          | Serial No.<br>10/023,125   |    |
| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                                                                                                                                                                                       |     |                                                                                                                                                                                                                                                           |            |                   | Applicant<br>Yoo, et al.         |          |                            |    |
| (Use several sheets if necessary)                                                                                                                                                                                                                |     |                                                                                                                                                                                                                                                           |            |                   | Filing Date<br>December 17, 2001 |          | Group<br>Unknown           |    |
| Examiner Unknown                                                                                                                                                                                                                                 |     |                                                                                                                                                                                                                                                           |            |                   |                                  |          |                            |    |
|                                                                                                                                                                 |     |                                                                                                                                                                                                                                                           |            |                   |                                  |          |                            |    |
| <b>U.S. Patent Documents</b>                                                                                                                                                                                                                     |     |                                                                                                                                                                                                                                                           |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                                |     | Document Number                                                                                                                                                                                                                                           | Issue Date | Applicant(s) Name | Class                            | Subclass | Filing Date If Appropriate |    |
|                                                                                                                                                                                                                                                  | A68 | 5,641,984                                                                                                                                                                                                                                                 | 06/24/97   | Aftergut et al.   | 257                              | 433      | 08/19/1994                 |    |
|                                                                                                                                                                                                                                                  | A69 | 5,644,128                                                                                                                                                                                                                                                 | 07/01/97   | Wollnik et al.    | 250                              | 251      | 08/25/1994                 |    |
|                                                                                                                                                                                                                                                  | A70 | 5,693,139                                                                                                                                                                                                                                                 | 12/02/97   | Nishizawa et al.  | 117                              | 89       | 06/15/1993                 |    |
|                                                                                                                                                                                                                                                  | A71 | 5,705,224                                                                                                                                                                                                                                                 | 01/06/98   | Murota et al.     | 427                              | 248.1    | 01/31/1995                 |    |
|                                                                                                                                                                                                                                                  | A72 | 5,707,880                                                                                                                                                                                                                                                 | 01/13/98   | Aftergut et al.   | 437                              | 3        | 01/17/1997                 |    |
|                                                                                                                                                                                                                                                  | A73 | 5,711,811                                                                                                                                                                                                                                                 | 01/27/98   | Suntola et al.    | 118                              | 711      | 11/28/1995                 |    |
|                                                                                                                                                                                                                                                  | A74 | 5,730,802                                                                                                                                                                                                                                                 | 03/24/98   | Ishizumi et al.   | 118                              | 719      | 12/27/1996                 |    |
|                                                                                                                                                                                                                                                  | A75 | 5,747,113                                                                                                                                                                                                                                                 | 05/05/98   | Tsai              | 427                              | 255.5    | 07/29/1996                 |    |
|                                                                                                                                                                                                                                                  | A76 | 5,749,974                                                                                                                                                                                                                                                 | 05/12/98   | Habuka et al.     | 118                              | 725      | 07/13/1995                 |    |
|                                                                                                                                                                                                                                                  | A77 | 5,796,116                                                                                                                                                                                                                                                 | 08/18/98   | Nakata et al.     | 257                              | 66       | 07/25/1995                 |    |
|                                                                                                                                                                                                                                                  | A78 | 5,807,792                                                                                                                                                                                                                                                 | 09/15/98   | Ilg et al.        | 438                              | 758      | 12/18/1996                 |    |
|                                                                                                                                                                                                                                                  | A79 | 5,830,270                                                                                                                                                                                                                                                 | 11/03/98   | McKee et al.      | 117                              | 106      | 08/05/1996                 |    |
|                                                                                                                                                                                                                                                  | A80 | 5,835,677                                                                                                                                                                                                                                                 | 11/10/98   | Li et al.         | 392                              | 401      | 10/03/1996                 |    |
| <b>Foreign Patent Documents</b>                                                                                                                                                                                                                  |     |                                                                                                                                                                                                                                                           |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                                |     | Document Number                                                                                                                                                                                                                                           | Date       | Country           | Class                            | Subclass | Translation                |    |
|                                                                                                                                                                                                                                                  |     |                                                                                                                                                                                                                                                           |            |                   |                                  |          | YES                        | NO |
|                                                                                                                                                                                                                                                  | B21 | 96/17107 A1                                                                                                                                                                                                                                               | 06/06/1996 | WO                | C23C                             | 16/44    |                            | X  |
|                                                                                                                                                                                                                                                  | B22 | 93/02111 A1                                                                                                                                                                                                                                               | 02/04/1993 | WO                | C08F                             | 4/78     |                            | X  |
|                                                                                                                                                                                                                                                  | B23 | 91/10510 A1                                                                                                                                                                                                                                               | 07/25/1991 | WO                | B01J                             | 37/02    |                            | X  |
|                                                                                                                                                                                                                                                  | B24 | 0 799 641 A2                                                                                                                                                                                                                                              | 10/08/1997 | EP                | B01J                             | 20/32    |                            | X  |
| <b>OTHER ART</b>                                                                                                                                                                                                                                 |     |                                                                                                                                                                                                                                                           |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                                |     | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                                                                                                                                      |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                                  | C10 | Min, et al., "Atomic layer deposition of TiN thin films by sequential introduction of Ti precursor and NH/sub3", <i>Symp.: Advanced Interconnects and Contact Materials and Processes for Future Integrated Circuits</i> (Apr. 13-16, 1998), pp. 337-342. |            |                   |                                  |          |                            |    |
| Examiner                                                                                                                                                                                                                                         |     |                                                                                                                                                                                                                                                           |            |                   | Date Considered                  |          |                            |    |
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| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified)                                                                                                                                                             |     |                                                                                                                                                                                                        |            |                   | Docket No.<br>AMAT/5730          |          | Serial No.<br>10/023,125   |    |
| LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT                                                                                                                                                                                              |     |                                                                                                                                                                                                        |            |                   | Applicant<br>Yoo, et al.         |          |                            |    |
| (Use several sheets if necessary)                                                                                                                                                                                                                |     |                                                                                                                                                                                                        |            |                   | Filing Date<br>December 17, 2001 |          | Group<br>Unknown           |    |
| Examiner Unknown                                                                                                                                                                                                                                 |     |                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
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| <b>U.S. Patent Documents</b>                                                                                                                                                                                                                     |     |                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                                |     | Document Number                                                                                                                                                                                        | Issue Date | Applicant(s) Name | Class                            | Subclass | Filing Date If Appropriate |    |
|                                                                                                                                                                                                                                                  | A81 | 5,851,849                                                                                                                                                                                              | 12/22/98   | Comizzoli et al.  | 438                              | 38       | 05/22/1997                 |    |
|                                                                                                                                                                                                                                                  | A82 | 5,855,675                                                                                                                                                                                              | 01/05/99   | Doering et al.    | 118                              | 719      | 03/03/1997                 |    |
|                                                                                                                                                                                                                                                  | A83 | 5,855,680                                                                                                                                                                                              | 01/05/99   | Soininen et al.   | 118                              | 719      | 11/28/1995                 |    |
|                                                                                                                                                                                                                                                  | A84 | 5,858,102                                                                                                                                                                                              | 01/12/99   | Tsai              | 118                              | 719      | 02/14/1998                 |    |
|                                                                                                                                                                                                                                                  | A85 | 5,879,459                                                                                                                                                                                              | 03/09/99   | Gadgil et al.     | 118                              | 715      | 08/29/1997                 |    |
|                                                                                                                                                                                                                                                  | A86 | 5,904,565                                                                                                                                                                                              | 05/18/1999 | Nguyen, et al.    | 438                              | 687      | 07/17/1997                 |    |
|                                                                                                                                                                                                                                                  | A87 | 5,916,365                                                                                                                                                                                              | 06/29/99   | Sherman           | 117                              | 92       | 08/16/1996                 |    |
|                                                                                                                                                                                                                                                  | A88 | 5,923,056                                                                                                                                                                                              | 07/13/99   | Lee et al.        | 257                              | 192      | 03/12/1998                 |    |
|                                                                                                                                                                                                                                                  | A89 | 5,923,985                                                                                                                                                                                              | 07/13/99   | Aoki et al.       | 438                              | 301      | 01/14/1997                 |    |
|                                                                                                                                                                                                                                                  | A90 | 5,925,574                                                                                                                                                                                              | 07/20/99   | Aoki et al.       | 437                              | 31       | 04/10/1992                 |    |
|                                                                                                                                                                                                                                                  | A91 | 5,942,040                                                                                                                                                                                              | 08/24/99   | Kim et al.        | 118                              | 726      | 08/27/1997                 |    |
|                                                                                                                                                                                                                                                  | A92 | 5,947,710                                                                                                                                                                                              | 09/07/1999 | Cooper, et al.    | 418                              | 63       | 06/16/1997                 |    |
|                                                                                                                                                                                                                                                  | A93 | 5,972,430                                                                                                                                                                                              | 10/26/99   | DiMeo, Jr. et al. | 427                              | 255.32   | 11/26/1997                 |    |
| <b>Foreign Patent Documents</b>                                                                                                                                                                                                                  |     |                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                                |     | Document Number                                                                                                                                                                                        | Date       | Country           | Class                            | Subclass | Translation                |    |
|                                                                                                                                                                                                                                                  |     |                                                                                                                                                                                                        |            |                   |                                  |          | YES                        | NO |
|                                                                                                                                                                                                                                                  | B25 | 0 442 490 A1                                                                                                                                                                                           | 08/21/1991 | EP                | C30B                             | 25/02    |                            | X  |
|                                                                                                                                                                                                                                                  | B26 | 0 344 352 A1                                                                                                                                                                                           | 12/06/1989 | EP                | H01L                             | 39/24    |                            | X  |
|                                                                                                                                                                                                                                                  | B27 | 62-091495 A                                                                                                                                                                                            | 04/25/1987 | JP                | C30B                             | 25/02    |                            | X  |
| <b>OTHER ART</b>                                                                                                                                                                                                                                 |     |                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                                |     | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                                                                                   |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                                  | C11 | Klaus, et al., "Atomic Layer Deposition of Tungsten using Sequential Surface Chemistry with a Sacrificial Stripping Reaction," Thin Solid Films 360 (2000), Pages 145 – 153, (Accepted Nov. 16, 1999). |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                                  | C12 | Min, et al., "Metal-Organic Atomic-Layer Deposition of Titanium-Silicon-Nitride Films", <i>Applied Physics Letters</i> , American Inst. Of Physics, Vol 75(11) (Sept. 13, 1999).                       |            |                   |                                  |          |                            |    |
| Examiner                                                                                                                                                                                                                                         |     |                                                                                                                                                                                                        |            |                   | Date Considered                  |          |                            |    |
| <b>*EXAMINER:</b> Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant. |     |                                                                                                                                                                                                        |            |                   |                                  |          |                            |    |

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| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified)                                                                                                                                                      |      |                                                                                                                                      |            |                   | Docket No.<br>AMAT/5730          |          | Serial No.<br>10/023,125   |    |
| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                                                                                                                                                                                |      |                                                                                                                                      |            |                   | Applicant<br>Yoo, et al.         |          |                            |    |
| (Use several sheets if necessary)                                                                                                                                                                                                         |      |                                                                                                                                      |            |                   | Filing Date<br>December 17, 2001 |          | Group<br>Unknown           |    |
| Examiner Unknown                                                                                                                                                                                                                          |      |                                                                                                                                      |            |                   |                                  |          |                            |    |
| <b>U.S. Patent Documents</b>                                                                                                                                                                                                              |      |                                                                                                                                      |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |      | Document Number                                                                                                                      | Issue Date | Applicant(s) Name | Class                            | Subclass | Filing Date If Appropriate |    |
|                                                                                                                                                                                                                                           | A94  | 6,001,669                                                                                                                            | 12/14/99   | Gaines et al.     | 438                              | 102      | 07/21/1992                 |    |
|                                                                                                                                                                                                                                           | A95  | 6,015,590                                                                                                                            | 01/18/00   | Suntola et al.    | 427                              | 255.23   | 11/28/1995                 |    |
|                                                                                                                                                                                                                                           | A96  | 6,025,627                                                                                                                            | 02/15/00   | Forbes et al.     | 257                              | 321      | 05/29/1998                 |    |
|                                                                                                                                                                                                                                           | A97  | 6,036,773                                                                                                                            | 03/14/00   | Wang et al.       | 117                              | 97       | 03/27/1997                 |    |
|                                                                                                                                                                                                                                           | A98  | 6,042,652                                                                                                                            | 03/28/00   | Hyun et al.       | 118                              | 719      | 09/07/1999                 |    |
|                                                                                                                                                                                                                                           | A99  | 6,043,177                                                                                                                            | 03/28/00   | Falconer et al.   | 502                              | 4        | 01/21/1997                 |    |
|                                                                                                                                                                                                                                           | A100 | 6,124,158                                                                                                                            | 09/26/00   | Dautartas et al.  | 438                              | 216      | 06/08/1999                 |    |
|                                                                                                                                                                                                                                           | A101 | 6,113,977                                                                                                                            | 09/05/00   | Soininen et al.   | 427                              | 64       | 09/11/1997                 |    |
|                                                                                                                                                                                                                                           | A102 | 6,130,147                                                                                                                            | 10/10/00   | Major et al.      | 438                              | 604      | 03/18/1997                 |    |
|                                                                                                                                                                                                                                           | A103 | 6,139,700                                                                                                                            | 10/31/00   | Kang et al.       | 204                              | 192.17   | 09/30/1998                 |    |
|                                                                                                                                                                                                                                           | A104 | 6,174,377                                                                                                                            | 01/16/2001 | Doering, et al.   | 118                              | 729      | 01/04/1999                 |    |
|                                                                                                                                                                                                                                           | A105 | 6,174,809                                                                                                                            | 01/16/2001 | Kang, et al.      | 438                              | 682      | 12/15/1998                 |    |
| <b>Foreign Patent Documents</b>                                                                                                                                                                                                           |      |                                                                                                                                      |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |      | Document Number                                                                                                                      | Date       | Country           | Class                            | Subclass | Translation                |    |
|                                                                                                                                                                                                                                           |      |                                                                                                                                      |            |                   |                                  |          | YES                        | NO |
|                                                                                                                                                                                                                                           | B28  | 60-065712 A                                                                                                                          | 04/15/1985 | JP                | C01B                             | 33/113   |                            | X  |
|                                                                                                                                                                                                                                           | B29  | 03-048421                                                                                                                            | 03/01/1991 | JP                | H01L                             | 21/302   |                            | X  |
|                                                                                                                                                                                                                                           | B30  | 03-286531                                                                                                                            | 12/17/1991 | JP                | H01L                             | 21/316   |                            | X  |
| <b>OTHER ART</b>                                                                                                                                                                                                                          |      |                                                                                                                                      |            |                   |                                  |          |                            |    |
| *Examiner Initial                                                                                                                                                                                                                         |      | Including Author, Title, Date, Pertinent Pages, Etc.                                                                                 |            |                   |                                  |          |                            |    |
|                                                                                                                                                                                                                                           | C13  | Martensson, et al., "Atomic Layer Epitaxy of Copper on Tantalum", <i>Chemical Vapor Deposition</i> , 3(1) (Feb. 1, 1997), pp. 45-50. |            |                   |                                  |          |                            |    |
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| *EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant. |      |                                                                                                                                      |            |                   |                                  |          |                            |    |

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| U.S. Department of Commerce, Patent and Trademark Office<br>(PTO Form 1449 modified) |  |  |  |  | Docket No.<br>AMAT/5730          |  | Serial No.<br>10/023,125 |  |
| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                           |  |  |  |  | Applicant<br>Yoo, et al.         |  |                          |  |
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| <b>LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>                                                                                                                                                                                |      |                                                                                                                                                                                         |             |                     | Applicant<br>Yoo, et al.         |          |                            |    |
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| Examiner                                                                                                                                                                                                                                  |      |                                                                                                                                                                                         |             |                     | Date Considered                  |          |                            |    |
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